# ATLAS WHITE PORTLAND CEMENT

*Pure* white *and with all the strength of gray Portland cement*

FOR

# SWIMMING POOLS


*The* Atlas Portland Cement Company

25 B*roadway* ~ N*ew York*, N. Y.

Chicago ~ Birmingham ~ Kansas City

Philadelphia ~ Boston ~ St. Louis ~ Des Moines

Dayton Omaha ~ Buffalo ~ Jacksonville, Fla.

A. I. A. FILE No. 35-F-2
SWIMMING POOLS—ATLAS WHITE PORTLAND CEMENT

RIDGEFIELD, CONN.

Jos. Roberts, *Designer*

# The Construction of Swimming Pools and the Use of White Portland Cement for Appearance

Concrete is the most available and economic material for the construction of swimming pools and is practically the only material used for that purpose. In this book are treated the questions of design, construction and the securing of an attractive color by the use of white Portland cement.

*Selecting the Site.* The site for the outdoor pool should be chosen for good natural drainage to prevent the presence of ground water during construction and water pressure under the floor of the pool when it is empty.

There should also be a plentiful water supply so that the water in the pool can be frequently changed.

*Size and Shape of Pool.* Pools of rectangular shape are less costly to build due to greater simplicity of form work and in the placing of the reinforcing steel. Curved corners or oval or circular pools largely increase the cost where the sides are vertical.

The circular or oval shape is well adapted and more economical for pools having dish shaped bottoms—that is, bottoms sloped at the sides without vertical walls.

For wading pools the sides are usually made sloping and the depth of the pool is about 18 to 24 inches. Pools used for swimming only, should have a minimum depth of 3′6″ but it is best to provide such pools with a deep section for diving which should have a minimum depth of about 8′6″.

In the case of larger pools for commercial purposes or public pools, about 75% of the pool need be of a depth of 4′6″ or less for swimming and wading and the remaining 25% sloping down to the 9 foot diving depth.

*Principles of Design.* The illustrations on page 13 of this booklet suggest a design for rectangular swimming pools. On page 14 is shown a sketch for an oval shaped pool. Complete detailed plans for either of these pools will be furnished on request. The drawings for the rectangular pool can be used as a guide in preparing plans for pools of practically any size having vertical walls. In changing the dimensions on these plans to be used in building pools larger or smaller than the one shown, it should be kept in mind that the size and spacing of reinforcement for any given section of walls is determined by the height of the wall at that section. The walls for the rectangular pool are designed to resist the inward pressure of the earth when the pool is empty and the unbalanced outward pressure of the water when the pool is full. It is assumed that they will rest on firm soil suitable for a foundation. Cracks in the concrete floor slab may be caused by temperature stresses unless the slab is properly reinforced and divided by expansion joints into sections having no dimensions greater than 60 feet. Expansion joints need not be provided in straight reinforced walls at intervals of less than 100 feet.

The plans for the oval shaped pool can be used as a guide in designing circular or irregularly shaped pools of any size. The floor area should be divided into sections by expansion joints so that no section would have a side more than 60 feet long.

*Special Features.* As no pool is complete without a spring board, provisions should be made for one or more at the deep end of the pool. Springboard details are shown on page 14. Chutes or slides also add much to the attraction of pools and in some pools sunshades of canvas have been found desirable.

The suggested design for a rectangular pool shows two ladders, one near the spring-board and the other near the corner at the shallow end of the pool. By embedding short piping in the top of the wall and in the floor when the concrete is placed, and later fastening the ladder to these, the work of installing the ladder will be made very simple. If preferred, ladder rungs may be embedded directly in the walls, or bolts may be placed to which the rungs are later fastened. Sometimes steps extending across the entire end of the pool are used. If these are built, the surface should be left gritty, as by a wooden float, or it may be washed with acid. This finish should also be given to the top of the wall to prevent slipping.

Provision must also be made for safety of swimmers by placing a hand-hold, pipe rail or rope above the water around the pool so that swimmers may hold on to this and support themselves at the surface of the water with little effort. The best arrangement

is a combination hand-hold and scum gutter built into the wall at the time of construction. If a scum gutter is not provided, ringbolts spaced about 10 feet apart may be embedded near the top of the wall. A galvanized pipe not less than 1½ inches outside diameter placed through these bolts, will form an excellent support or a large rope stretched tight will serve. All diving platforms, stairways to chutes and platform around the tops of chutes or slides must be protected with guard railings.

*Walks and Beaches.* In planning a pool the question sometimes arises as to whether the area between the pool and the surrounding fence or bath house shall be paved, used as a sand beach or sodded over with grass. A sand beach is not recommended as bathers carry sand into the pool on their suits and feet, and in a surprisingly short time so much of it will accumulate in the pool that it will make the water cloudy regardless of the filtration system, and the removal of the sand will be an important item of expense in the course of a season.

A grass plot around the pool requires constant attention to keep it attractive. Bathers carry newly mown grass into the pool on their feet. Walking or lounging on the grass wears it out.

A concrete pavement over the area around a pool is more sanitary and in the long run is more satisfactory than either sand or grass. An adequate number of benches around the enclosure will provide comfortable places for swimmers to rest.

*Safeguarding the Pool.* Spring-boards should be covered with corrugated rubber mats, or other suitable material, to prevent them from becoming slippery. Sidewalks adjacent to the edges of pools should be finished with wood floats to prevent them from becoming slippery. They should drain away from the pool.

Concrete Steps in Pool.

*Special Precautions.* The design and construction of a swimming pool should be such as to render it easy to keep the pool and its surroundings clean. A scum gutter extending all around the pool should be provided to carry away surface débris and impurities.

The depths of the pool should be painted above the scum gutter in prominent letters at intervals of 15 feet. Life-buoys should be provided in convenient places.

*Lighting.* A good lighting system adds much to the attractiveness of a pool and increases its hours of usefulness.

The choice of lighting equipment will depend on the size and shape of the pool. Better results are obtained from incandescent lights when they are used with special reflectors to throw the light where it is most required. Various systems of flood lighting and arc lights are used to excellent advantage in large pools where the number of incandescent globes required would be excessive. Expert advice on lighting pools can be obtained without charge from the lighting departments of the leading electric manufacturers.

*Sanitation.* Private pools used by few persons may require little or no attention during the summer beyond occasional cleaning and refilling. If there is a tendency for algae to grow, the elevation of the water should be lowered to below the plant growth leaving the algae on the walls. The walls are then sprayed with a 5% solution of copper sulphate and thoroughly scrubbed. This should be done as frequently as conditions require.

For larger pools more thorough sanitation is necessary and various methods are used such as chlorination, ultra violet ray treatment, ozone treatment, etc. On request, we will put you in touch with the sources of proper information on this subject.

Greenwich, Conn. Swimming Pool Const. Corp.

*Cost.* The cost of a concrete swimming pool is determined by the size of the pool, by its design and by local prices of material and labor. After a tentative design has been selected, a reliable estimate of the cost of proposed pool can usually be furnished by some local engineer, architect, or contractor who is familiar with local prices of material and labor.

The items which make up the cost of the pool are: cost of the site, clearing site, excavation, materials for concrete, form lumber, reinforcement, piping, valves, accessories and labor for building forms, placing reinforcement, mixing and placing concrete. The materials required for each cubic yard of concrete are 1.74 bbl. of cement, 0.52 cu. yd. of sand and 0.77 cu. yd. of pebbles or crushed rock, where the recommended mix of 1 part cement, 2 parts sand and 3 parts of pebbles or crushed rock is used.

| CLASS OF WORK | QUANTITIES | | |
|---|---|---|---|
| | 20x60 Ft. Rectangular Pool | 45x105 Ft. Rectangular Pool | 163x250 Ft. Oval Pool |
| Excavation | 355 cu. yd. | 1,328 cu. yd. | 4,610 cu. yd. |
| Drain tile, 8-inch size | ..... | ..... | 200 lin. ft. |
| Drain tile, 6-inch size | 180 lin. ft. | 300 lin. ft. | 1,423 lin. ft. |
| Sidewalk, 4 ft. wide, 5in. thick | 731 sq. ft. | 1,285 sq. ft. | 2,660 sq. ft. |
| Curb wall, 2 ft. 5 in. high, 12 in. thick | ..... | ..... | 665 lin. ft. |
| Footings for walls | 29 cu. yd. | 51 cu. yd. | ..... |
| Reinforced walls | 32 cu. yd. | 65 cu. yd. | ..... |
| Form-area for walls | 2,040 sq. ft. | 3,456 sq. ft. | 3,325 sq. ft. |
| Floor slab, 6 in. thick | 1,200 sq. ft. | 4,725 sq. ft. | 32,320 sq. ft. |
| Steel reinforcement, ½ in. and ⅝ in. round bars | 5,809 pounds | 10,738 pounds | ..... |
| Wire mesh reinforcement in floor 35 lb. per 100 sq. ft. | 420 pounds | 1,650 pounds | 11,305 pounds |

Add cost of cast iron pipe, valves, spring-boards and accessories.
Allow for engineering services and contractors' profit.

Waterproofing exterior of pool with hot pitch.

CHAPPAQUA, N. Y.

Pentecost and Martin, Inc., *Landscape Architects*

# The Appearance of the Pool and the Use of Atlas White Portland Cement

The most important requirement for a swimming pool is cleanliness. In order to give the pool a clean and sanitary appearance it is preferable to have the walls and floor white or nearly white in color.

Atlas White Portland Cement* makes possible a white or light color which cannot be obtained by using regular gray Portland cement.

The desirable white color may be obtained by any one of three methods and the difference in cost is but slight. The best method is to make the pool of white concrete by employing White Atlas Portland Cement instead of gray cement for mixing the concrete. The forms are carefully made and the only treatment necessary is to rub down the walls with a carborundum stone either by hand or by power machine.

This method of making the walls entirely of white cement concrete has the great advantage that the walls are a monolith—that is, of one solid piece. As the concrete is of a rich mixture it is dense and impervious. The second method of securing a white surface for the walls is the plastering method. Here the main or structural part of the walls are made of concrete in which gray cement is used. After the concrete has hardened the walls are faced by plastering with a mortar coat. White Portland cement is used for the mortar coat. The plastering

* Atlas White Portland Cement is pure white, full strength Portland cement passing every test of the Standard Specification for Portland cement of the American Society for Testing Materials.


RYE, N. Y.

Polhemus & Coffin, *Architects*

method of lining pools is frequently employed and cannot be considered to give as good results as monolithic wall construction. However, when done by competent masons the results are satisfactory.

The forms should be removed as soon as possible and the walls roughened by brushing with a heavy wire brush to expose the aggregates and thus give a good surface on which to bond. (There is a chemical preparation doing this now on the market.) A mortar coat of gray Portland cement, mixed in the proportions of about 1 bag of cement, 2½ cubic feet (2½ bags) sand and 5 pounds of hydrated lime is then applied to even the surface. This coat is thoroughly scratched. The finish coat is mixed in the same proportions, using white Portland cement and white sand and brought to a true surface with the minimum of trowelling. This finish should be thoroughly cured by sprinkling for at least 10 days.

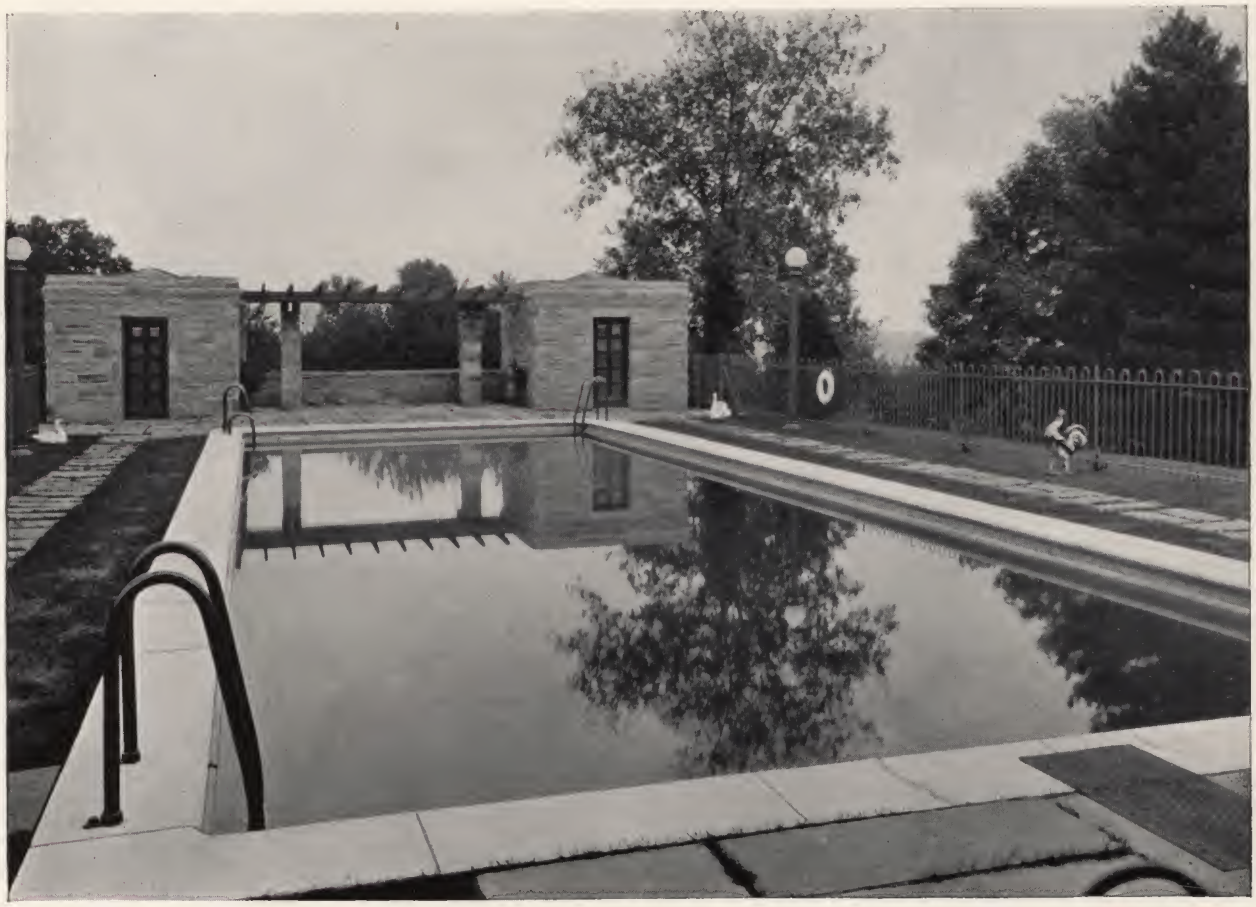
When it is not desired to use either of the methods just described a third method may be utilized. In this method the facing of the walls may be made of white concrete by pouring simultaneously a white facing concrete and a backing of gray cement concrete as shown on the next page. Since the two mixtures are poured at the same time there is no question regarding the proper bonding or amalgamation of the two concretes.

The floor is constructed alike in all cases. A base made of gray cement concrete is first laid and on top of this there is applied a white mortar finish coat of about three-quarters to one inch thickness. The base and top course are laid at the same time so that the base is still soft when the top course is laid on it.

GREAT NECK, L. I., N. Y. G. A. Richardson, *Architect*

RIDGEFIELD, CONN. Jos. Roberts, *Designer*

Light metal lath of rather coarse mesh is fastened to the inside vertical reinforcing and there should be at least two inches between the lath and the inside face of the forms. This space is filled with white Portland cement mortar to a depth of about two feet and then the backing concrete is poured immediately after. The two bond together through the metal lath. The operation is repeated until the wall is completed.



RADNOR, PA.

John T. Windrim, *Architect*

LITTLETON, N. H.
E. K. Borchard, *Designer*

*All the pools shown on this page are made of white concrete*

Swimming Pool Construction Corp., *Designer*
HICKSVILLE, L. I., N. Y.

Sheet metal form for scum gutter. Template for plastering in place.

Completed gutter

*Construction details of a scum gutter in a plastered pool.*

Template for forming scum gutter.

Running edge of scum gutter with template supported on a guide board.

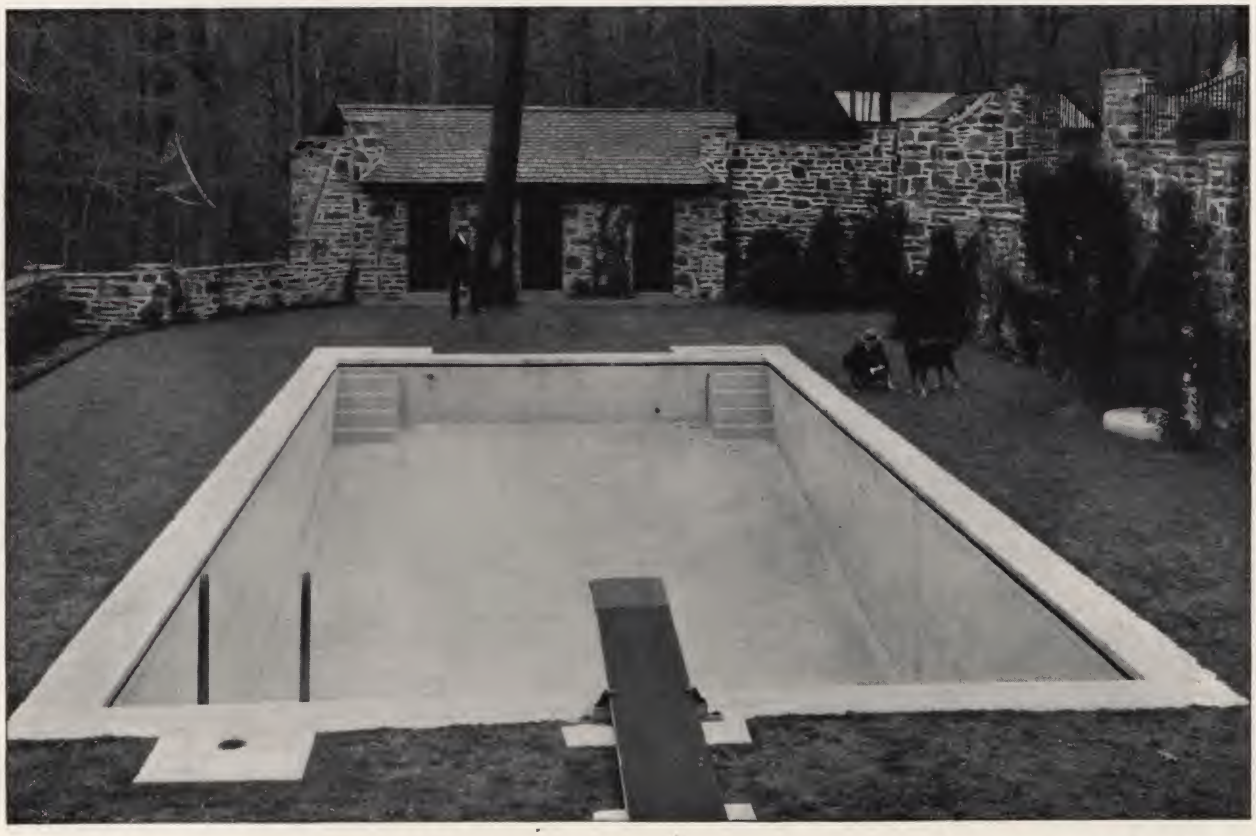
Curing the plastered finish by spraying.

Vibrating the forms with an electric hammer.

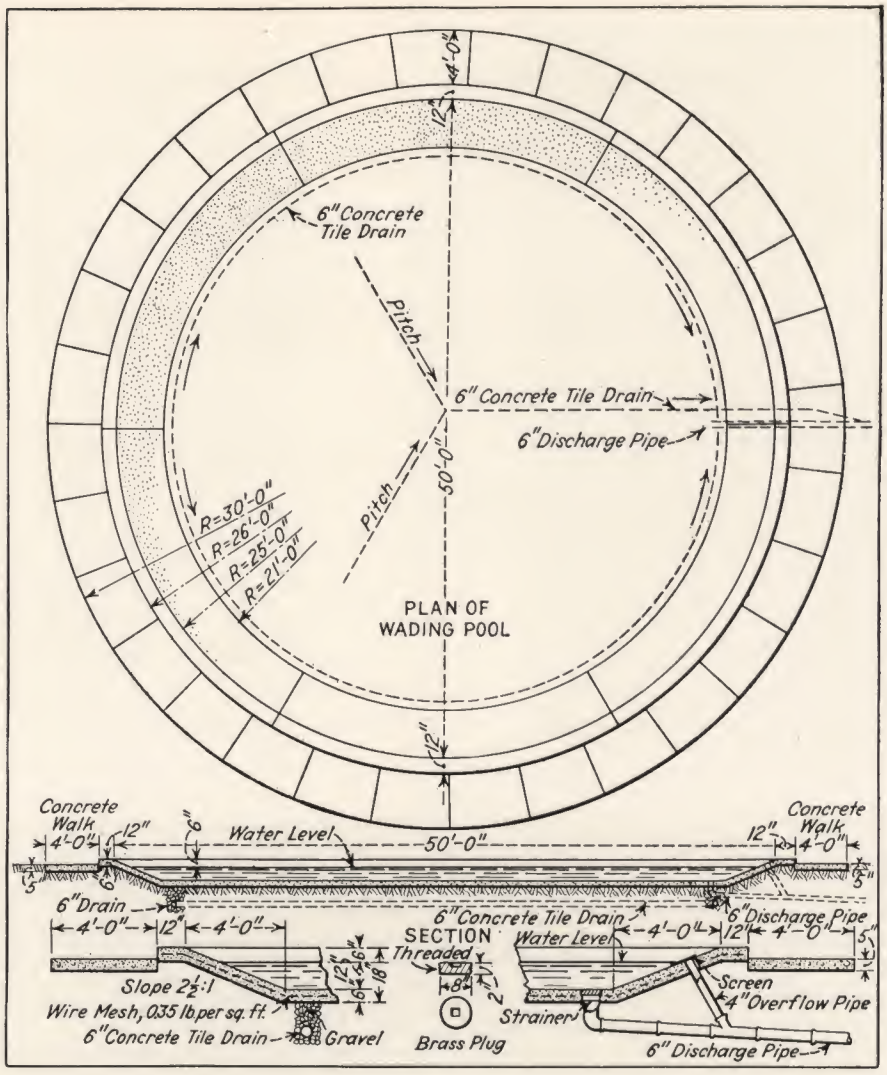
# Vibrating to Secure Dense Concrete

Ideal concrete is a homogeneous mass of sand, stone and cement. Many methods are used to produce this result and nowhere is it more important that the concrete be perfect than in structures containing water, such as swimming pools.

An effective and inexpensive method of securing this result is the vibrating of the forms. It can be done by hand by churning the concrete in the forms and pounding the outside of the forms with a wooden mallet. Vibrating the forms by an electric or pneumatic hammer is still more efficient. The results are surprising for this will give a very dense concrete and one almost free of segregation and surface defects, so that when the concrete is finally finished by rubbing it will give the appearance of a pool cut from a solid block of stone.

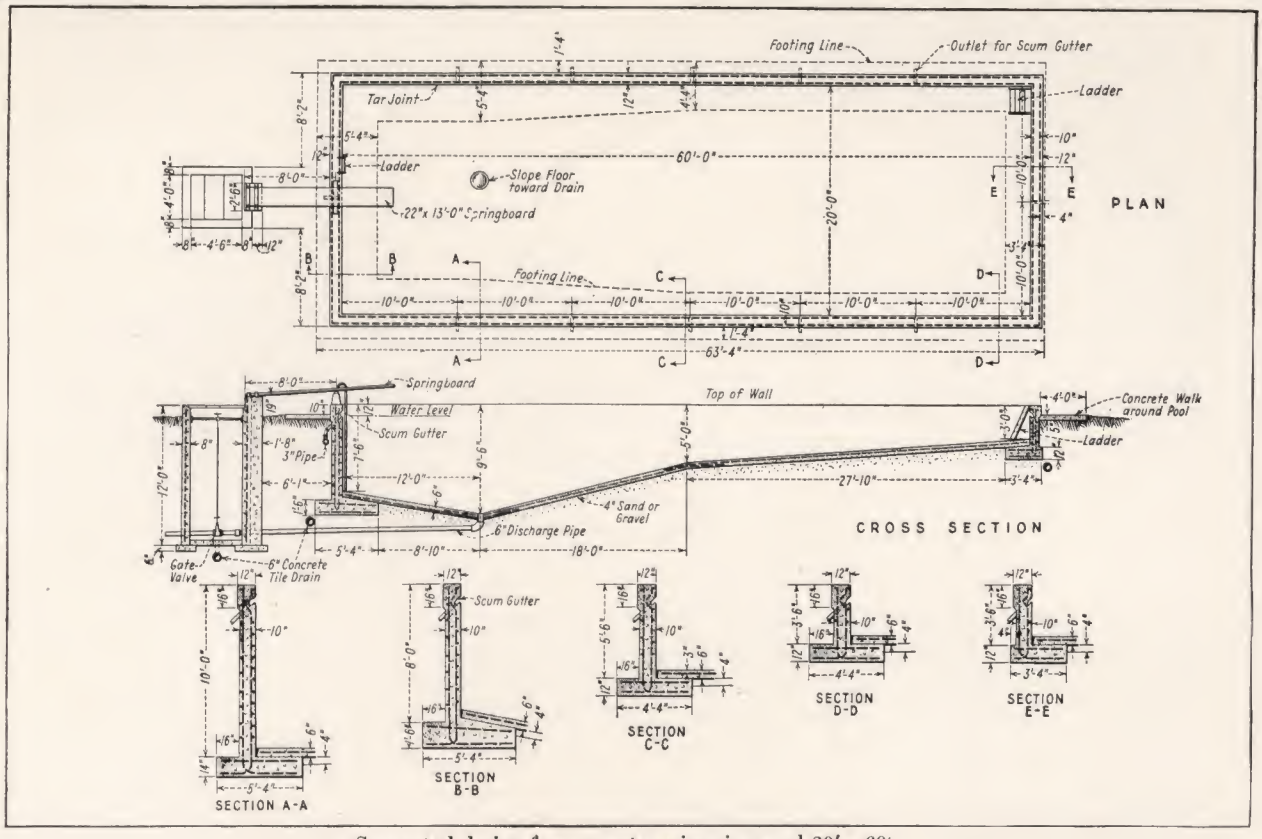


Stewardson & Page, *Architects*

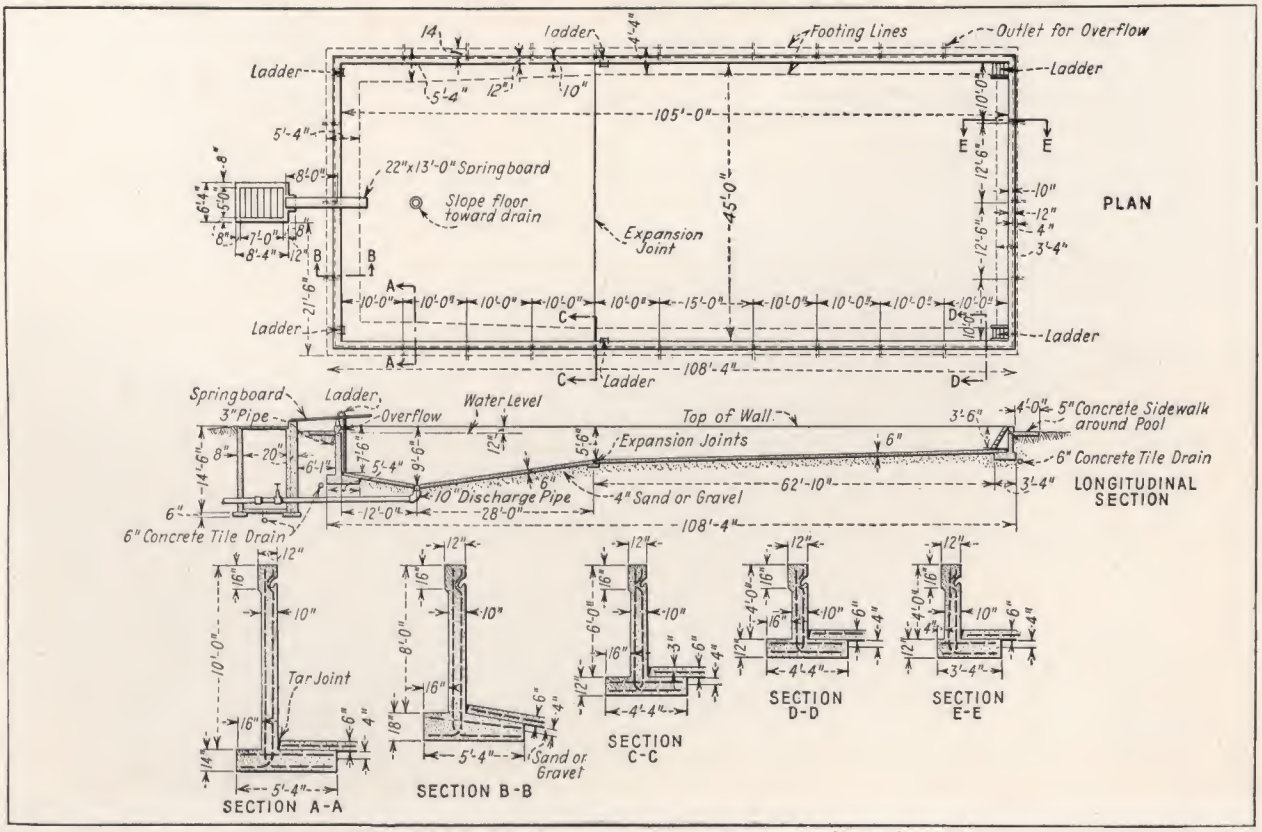



Suggested design for concrete wading pool.

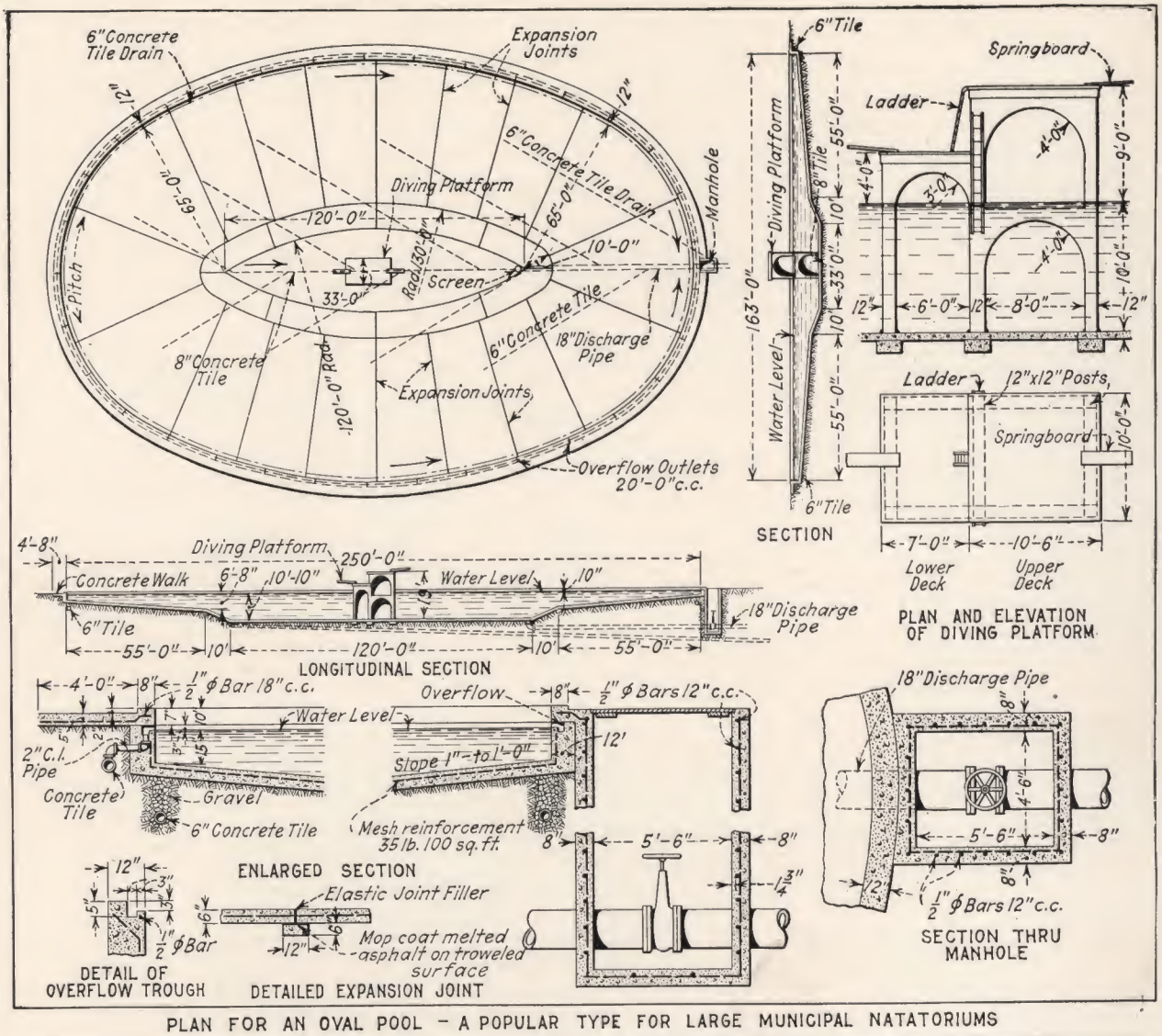
Wm. Moeller, *Architect*



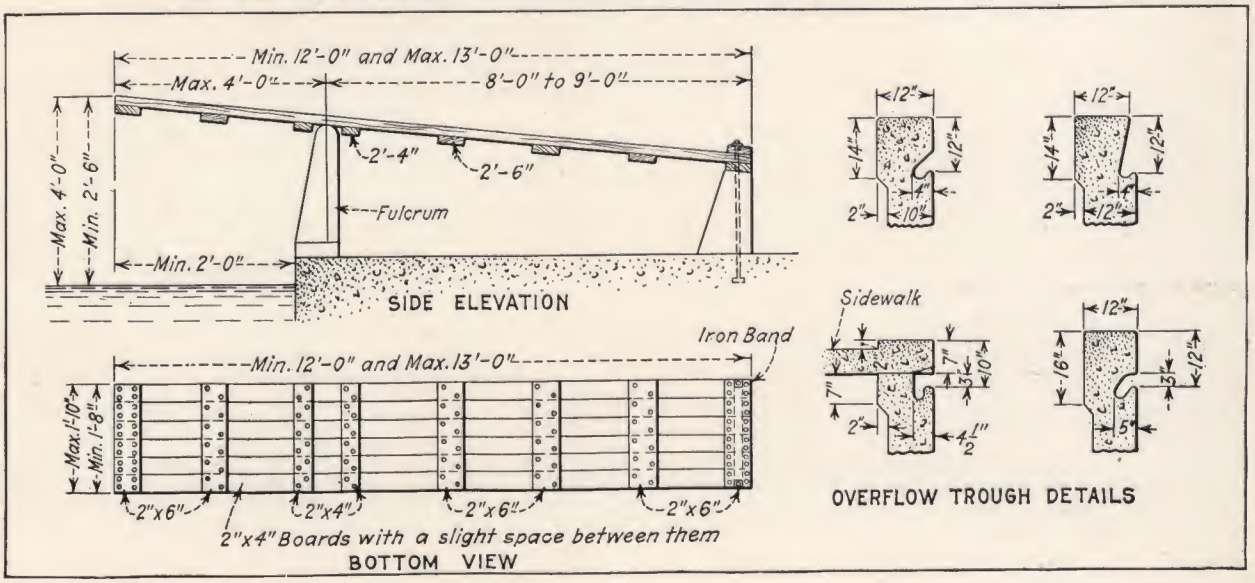

Suggested design for concrete swimming pool 20′ x 60′




Suggested design for concrete swimming pool 45′ x 105′




PLAN FOR AN OVAL POOL – A POPULAR TYPE FOR LARGE MUNICIPAL NATATORIUMS



# Condensed Specifications for Concrete Swimming Pool Construction

## GENERAL

### GENERAL CONDITIONS

The plain and reinforced concrete work shall be governed by the contract, these specifications and the plans.

## MATERIALS

### CEMENT

The cement shall meet the requirements of the current standard specifications for Portland cement of the American Society for Testing Materials.

### FINE AGGREGATE

Fine aggregate shall consist of sand or screenings from crushed rock or pebbles, well graded from fine to coarse, passing, when dry, a screen having four (4) meshes to the linear inch. Fine aggregate shall not contain injurious amount of vegetable or other organic matter, nor more than seven (7) per cent by volume of clay, dust or loam.

### COARSE AGGREGATE

Coarse aggregate shall consist of hard crushed rock or pebbles, free from vegetable or other organic matter and shall be practically free from soft, flat or elongated particles. It shall be well graded from ¼ inch to 1 inch in size, not more than five (5) per cent passing a screen having four (4) meshes per linear inch.

### MIXED AGGREGATE

Crusher-run stone, bank-run gravel or mixtures of fine and coarse aggregate prepared before delivery on the work shall not be used, unless same are tested beforehand and proportioned so as to insure obtaining a concrete of the required quality, density and strength.

### WATER

Water shall be clean and free from oil, acid, alkali, organic matter or other deleterious substances. It should be pure enough to drink.

### REINFORCEMENT

Reinforcing metal shall meet the requirements of the current standard specifications for steel reinforcement of the American Society for Testing Materials. It shall be free from excessive rust, scale, paint, or coatings of any character which would tend to reduce or destroy the bond. Either plain or deformed steel bars or wire mesh shall be used.

### JOINT FILLER

The joint filler shall be an elastic water-proof material that will not become soft and run out in hot weather nor hard and brittle in cold weather.

## CONSTRUCTION

### EXCAVATION

Excavation shall be made to the proper dimensions and elevations, allowing for exterior forms and line of drain tile, and for sand fill under floor if required. All refuse material encountered at grade shall be removed and all soft or spongy spots excavated and holes refilled with well tamped sand or gravel.

### SUBBASE

After the walls have been erected and the forms removed, a four (4) inch subbase of sand shall be provided to insure a firm foundation for the floor. The sand should be wet down and well compacted by rolling and should be wet, but with no standing water, when the concrete for the floor is placed.

**Note:** The subbase may be omitted if pool is built in porous, sandy soil or gravel.

### DRAINAGE

A line of six (6) inch drain tile, extending completely around the pool, shall be placed around the outer, lower edge of the wall footings and also under the floor of the pool. The lowest point of the drain should be connected with another drain leading to a suitable outlet.

### PLUMBING

The necessary piping for filling and emptying the pool, as well as foran overflow system, should be provided and placed as required.

### MEASURING

The method of measuring each of the constituent materials shall be such as to insure the specified proportions in each batch. A sack of Portland cement (94 pounds net) shall be considered as one cubic foot or one-fourth of a barrel.

### CONCRETE MIXING

All concrete shall be mixed in an approved type of batch mixer (except when under special conditions the engineer otherwise permits). The ingredients of the concrete shall be mixed to the required consistency for at least one and one-half (1½) minutes after all materials are in the mixer before any part of the batch is discharged from the drum. The mixer should be equipped with a water measuring device which can be locked also with a suitable charging hopper.

### RETEMPERING

Retempering of concrete or mortar which has partially hardened, that is, remixing with or without additional materials or water, shall not be permitted.

### FORMS

Forms shall be smooth, substantial, unyielding and so constructed that the concrete will conform to the designed shape and dimensions.

### REINFORCEMENT

Reinforcement shall be placed in the exact location shown on the plans and wired at intersections so that it will not become disarranged during the depositing of concrete. If the bars must be spliced, not less than forty (40) times the diameter of the bar shall be allowed for the splice, and bars shall be separated at least 1½ diameters of the larger bar. In splicing wire mesh or fabric at least four (4) inches shall be allowed for the lap. Splices should be avoided at points of maximum stress.

### PROPORTIONS

The concrete should be mixed in the proportions of one (1) sack of Portland cement, two (2) cubic feet of fine aggregate, and three (3) cubic feet of coarse aggregate.

### CONSISTENCY

In mixing the concrete, the least amount of water should be used which it is possible to employ and still obtain a workable plastic mixture which can be worked into the forms and around the reinforcement. The proper consistency is perhaps best described as "quaky." An excess of water **must** be avoided as it seriously affects the strength and impermeability of the concrete, and any batch of concrete containing such an excess should be rejected.

### PLACING

The concrete shall be placed in its final position as soon as possible after mixing and must be in place within thirty (30) minutes after the water has been added to the dry materials. It should be placed in horizontal layers in the walls not more than nine inches deep in as continuous an operation as possible so as to avoid construction joints. Concrete should not be placed in water. If underground springs are encountered they should be drained to a sump outside the forms and pumped out until the concrete is above the water line. The concrete should be well spaded and if the forms are rapped with mallets while placing it will help settle the concrete in place and eliminate air bubbles and stone pockets.

### JOINTS

The surface of the footings covered by the floor slab shall be coated with tar or asphalt to prevent a bond between footings and slab, thus allowing the floor to act independently of the footings.

### SURFACE FINISH

Immediately after the forms have been removed all projections and irregularities on the exposed surfaces shall be carefully removed and all cavities neatly filled with mortar. Enough 1 : 2 Portland cement and sand mortar should be used to fill cavities. If desired, the interior surface of the walls may be more smoothly finished by wetting and thoroughly rubbing with a concrete brick or carborundum stone to obtain a still denser surface. The top of the walls should be left gritty to prevent slipping.

### PLASTERING

The plastering shall consist of two coats. The surface of the concrete shall be thoroughly roughened and wet down to receive the first coat which shall consist of one part of Portland cement to not more than 2½ parts of sand. To this may be added not more than 10% by volume of hydrated lime. This coat shall be brought to a smooth surface and thoroughly scratched. The finish coat shall consist of one part Atlas-White Portland cement and not more than 2½ parts of White sand to which may be added not more than 10% by volume of hydrated lime. The finish coat shall be brought to a smooth surface with the minimum of trowelling.

### GENERAL

All exposed surfaces should be finished with a smooth and neat appearance.

### PROTECTION

Exposed surfaces should be kept wet for a period of at least ten days after placing in dry, hot weather.

### TEMPERATURE BELOW 35 DEGREES F.

If at any time during the progress of the work the temperature reaches, or in the opinion of the engineer may within twenty-four (24) hours drop to 35 degrees Fahrenheit, the water and aggregate should be heated and precautions taken to protect the work from freezing for at least five (5) days.

### REMOVAL OF FORMS

The wall forms should remain in place at least thirty-six (36) hours after the concrete has been placed or until the concrete has hardened sufficiently to be self-sustaining. When freezing weather occurs, forms and bracing should remain in place an additional time equal to the time the structure has been exposed to freezing. No outside pressure should be placed on the concrete before the removal of all forms.

Information on the use of Portland cement will be gladly furnished you by The Atlas Technical Department, which consists of a staff of trained Engineers and is maintained for the purpose of cooperating with users of cement.

You are under no obligation for the service. The Company furnishes this book and the information and assistance referred to above, without guaranty, warrant or other obligation on its part.

THE ATLAS PORTLAND CEMENT COMPANY.

# ATLAS WHITE PORTLAND CEMENT

"Pure WHITE and with all the strength of gray Portland cement."

We are manufacturers of Portland cement of two colors, gray and white. Both of these conform in every way with the Standard Specifications for Portland Cement of the American Society for Testing Materials and adopted by the U. S. Government, the American Institute of Architects, American Society of Civil Engineers and similar bodies.

Because of the pure white color of white Atlas Portland Cement it is used wherever the gray Atlas Portland cement does not give the desired color effect.

Atlas White Portland Cement can be used for any work for which gray Portland cement is suitable, because it gives equal strength, equal wear and equal durability.

The use of white Atlas Portland Cement results in a mortar which will not stain fine textured stone such as Indiana Limestone, marble and similar stones which might be stained by mortar made with gray Portland cement.

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Among the established uses of Atlas White Portland Cement are:—

*For its color*

*Stucco*—Makes possible a great variety of shades and tints because of neutrality of color. It is colored by mixing directly with a sand of the proper color or by pigments.

*Brick, Terra Cotta or Tile Joints*—Gives either a pure white mortar to contrast with the color of the material or a tinted joint to blend with the tonal value of the brick or terra cotta. It is colored by mixing directly with a sand of the proper color or by pigments.

*Cast Stone, Trim and Garden Furniture*—Gives white or colored effects where gray cement color would be dead and uninteresting.

*Terrazzo*—Makes possible an entirely new and attractive range of color effects. Will not soil and has the same wearing qualities as gray Portland Cement.

*Swimming Pools*—Used either with white sand or sometimes tinted as a plaster for lining swimming pools. Also used to pour the exterior walls to give a white effect directly.

*Interior Plastering*—For interior plastering it gives all the range of colors and with textured walls, the strength necessary to give good wearing quality.

It is unaffected by moisture and therefore also used for dairies, cold storage rooms and laboratories.

*For its non-staining qualities*

*Pointing, Setting and Backing Limestone.* Widely used for setting Indiana Limestone, marble and similar stone. Gives the strongest possible non-staining mortar.

Strength, Physical and Chemical Properties of Atlas White Portland Cement in comparison with the Standard Specifications for Portland Cement (which include White).

| 1 Part Cement and 3 Parts Sand, Tensile Strength per Square Inch. | Standard Specifications | Atlas White Portland Cement. |
|---|---|---|
| At 7 days | 200 Lbs. | 331 Lbs. |
| Ditto at 28 days | 300 Lbs. | 467 Lbs. |
| Loss on Ignition | Not to exceed 4.00% | 2.13% |
| Sulphuric Anhydride | " " " 2.00% | 1.83% |
| Magnesia | " " " 5.00% | 1.19% |
| Fineness—Residue on No. 200 sieve | " " " 22.00% | 6.9% |
| Initial set | Not less than 45 to 60 minutes | 2 hr. 30 min. |
| Final set | Within 10 hours | 5 hr. 00 min. |

## THE ATLAS PORTLAND CEMENT COMPANY

25 BROADWAY, NEW YORK

CHICAGO BIRMINGHAM KANSAS CITY

Philadelphia Boston St. Louis Des Moines
Omaha Buffalo Dayton Jacksonville, Fla.

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